Technical Datasheet #TDAXTC20

Thermocouple Scanner

20 Thermocouple Channels
CAN, SAE J1939
with Electronic Assistant®
P/N: AXTC20

Description: The Thermocouple Scanner monitors up to 20 channels of several types of thermocouples. The temperature information is provided to the engine control system over SAE J1939 CAN bus. A CANopen® model is available. Temperature information can include exhaust temperature, winding temperature, and fluid temperature monitoring. All 20 channels of temperature data are automatically sent over the CAN bus when power is applied with no additional programming or configuration required. Integral diagnostics determine thermocouple integrity and thermocouple inputs are isolated from each other. CAN communications are via an isolated CAN interface with SAE J1939 protocol. The Thermocouple module features rugged packaging and Deutsch IPD connectors and carries an IP65 rating.

During set-up, using an USB-CAN converter and a PC, the operator can configure the controller via the Electronic Assistant® to suit a wide variety of applications. Settings are saved to non-volatile memory upon command.

Applications:

- Stationary, portable power generator sets
- Genset control systems

Ordering Part Numbers:

20 Channel Thermocouple Module, SAE J1939 P/N: **AXTC20**
A CANopen® model is available under ordering p/n: AXTC20CO.

Electronic Assistant Service Tool P/N: **AX070502**
This Kit includes the following items.
USB-CAN Converter P/N: AX070501
1 ft. (0.3 m) USB Cable P/N: CBL-USB-AB-MM-1.5
12 in. (30 cm) CAN Cable with female DB-9 P/N: CAB-AX070501
AX070502IN CD P/N: **CD-AX070502**, includes: **Electronic Assistant®** software; EA & USB-CAN User Manual UMAX07050X; USB-CAN drivers & documentation; CAN Assistant (Scope and Visual) software & documentation; and the SDK Software Development Kit.

Mating Plug Kit P/N: **AX070200**
This kit includes the following items. These items are also available from a local Deutsch IPD distributor.
NB. The sealing plugs are only needed in cases where less than 20 thermocouple channels are installed.
A crimping tool from Deutsch IPD is required to connect wiring to the sockets, P/N: HDT 48-00 or equivalent (not supplied).

Deustch IPD P/N:	Description:
0462-201-16141	48 16AWG SOCKETS SOLID 16-20AWG WIRE 6mm
114017	24 SEALING PLUGS SIZE 12-16 CAVITIES 12-18 AWG
DRC16-40S	40-PIN PLUG, No Key
DT06-08SA	DT SERIES PLUG 8 CONTACT
W8S	WEDGELOCK FOR DT 8 PIN PLUG

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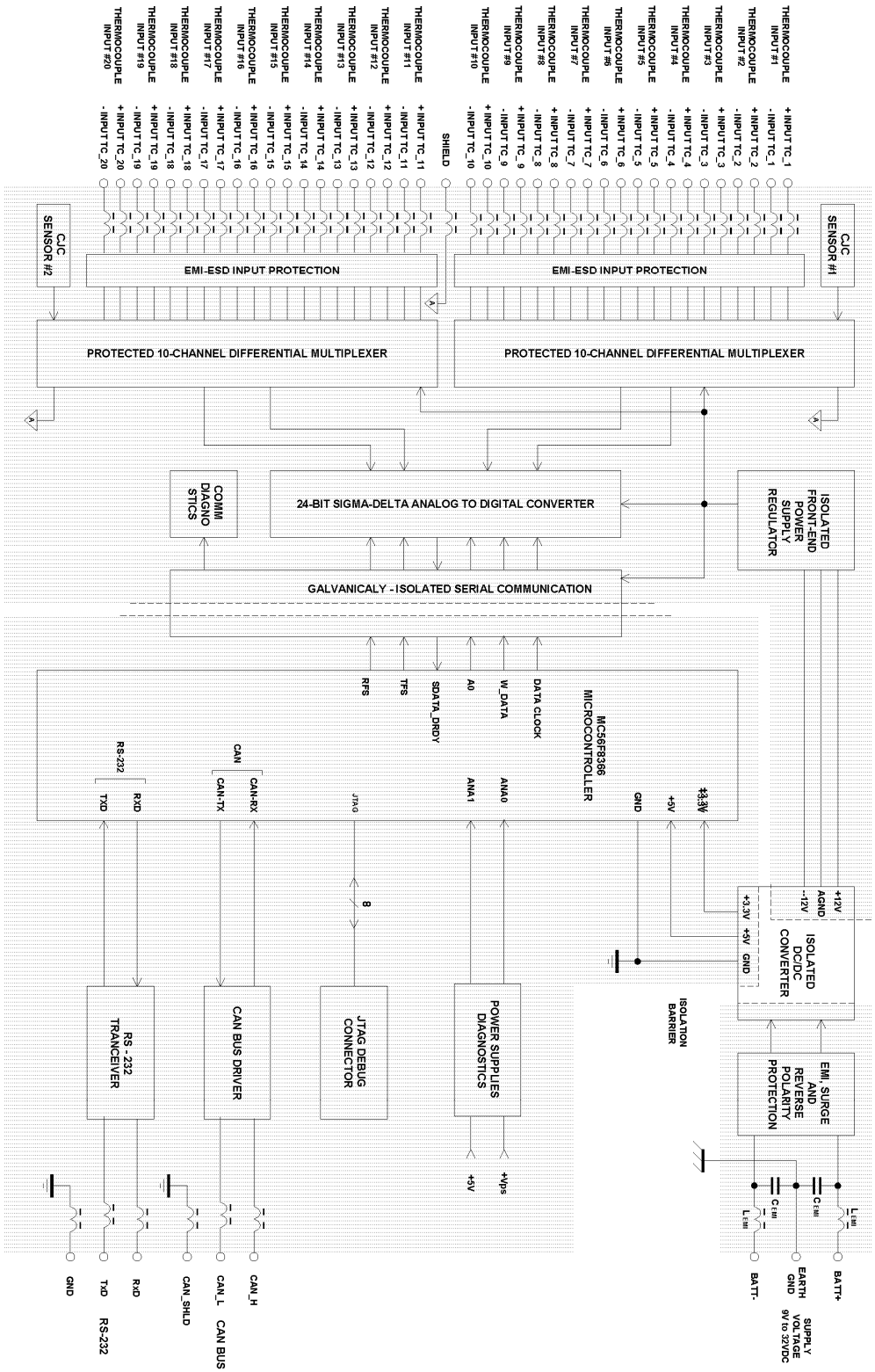
Block Diagram



Technical Specifications

Inputs

Power Supply Input	12V or 24VDC nominal (9…32 VDC power supply range)
Supply Current	200 mA at 12 V Typical 100 mA at 24 V Typical
Protection	Reverse polarity protection is provided. Power supply input section protects against transient surges and short circuits and is isolated from thermocouple inputs
Thermocouple Types	Up to 20 channels, independently configurable for B, E, J, K, N, R, S or T
Thermocouple Inputs	Temperatures are configured to indicate the SAE J1939 SPN to be transmitted by that temperature input. Accuracy: +/- 1°C with cold junction compensation or +/- 0.2°C without Resolution: 0.001°C
Scan Rate	100ms per channel, total sweep time maximum 2.2 seconds
Common Mode Readings	Input range +/- 4V maximum Rejection is 100db at 5Vp-p (50-60Hz)
Thermal Drift	150 ppm/°C of span (maximum)
Isolation	Digital isolation is 500VDC from input to ground. Three way isolation is provided for the CAN line, inputs and power supply
SPNs and PGNs	The SPN drop list includes all temperature SPNs from the J1939-71 standard published up to January of 2009. If an SPN is not supported by the drop list, the user can select a zero SPN, which then allows them to define the SPN and PGN per the application requirements. One byte parameters have a resolution of 1 °C / bit and a range of -40 °C to 210 °C. Two byte parameters have resolution of 0.03125 °C / bit and a range of -273 °C to 1735 °C (per SAE J1939). The Parameter Group Number (PGN) that will be used to send a temperature to the J1939 network will be entirely dependent on the Suspect Parameter Number (SPN) that was selected for that channel. In all cases, the PGN is a PDU2 type. Each PGN has a predefined priority and repetition rate associate with it.
Averaging	The average temperature of all the active channels can be broadcasted to the network using the default “Engine Average Information” PGN, or on a Proprietary B message.
Protection	Open circuit detection Frozen data detection Over or under temperature detection High temperature shutdown detection

Communication

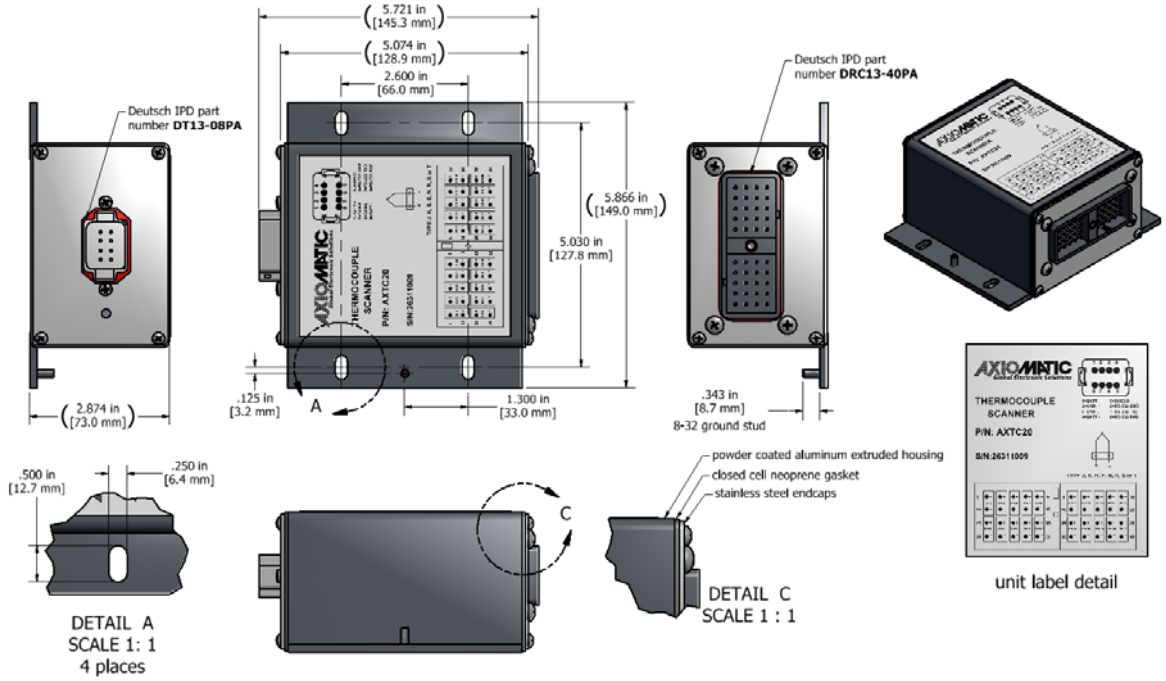
CAN	1 CAN 2.0B port, protocol SAE J1939 Digital isolation is provided for the CAN line.
Network Termination	According to the CAN standard, it is necessary to terminate the network with external termination resistors. The resistors are 120 Ohm, 0.25W minimum, metal film or similar type. They should be placed between CAN_H and CAN_L terminals at both ends of the network.
RS-232	1 RS-232 port is available for debugging purposes. ASCII Text Format, 115200 Baud Rate Data – 8 bit, Parity – None, Stop – 1 bit. Flow Control – Xon/Xoff. Short circuit protection to ground.

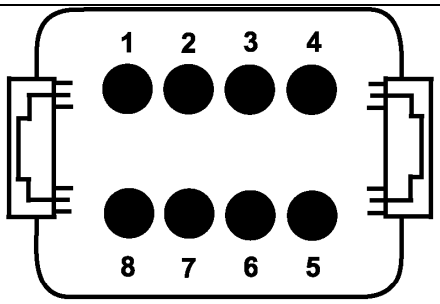
General Specifications

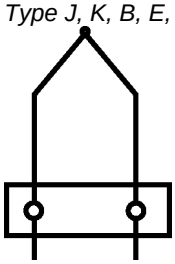
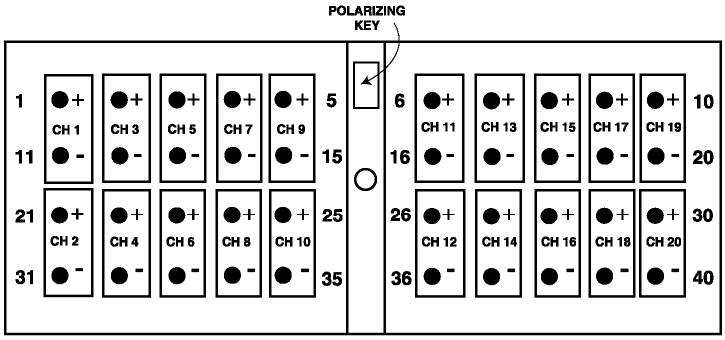
Microprocessor	MC56F8366,16-bit, 512 kByte flash program memory
Control Logic	User programmable functionality with the Electronic Assistant® • Node address is auto configurable as per J1939-81 and/or via customer configuration. • Monitored parameters and diagnostics are user selectable from a drop down list in the EA. • Monitored parameters and diagnostics are read-only over the network • Units are pre-configured with default values at the factory. Refer to the user manual. • The bit-rate is 250 kbit/s. Other bit-rates (125 kbit/s, 500 kbit/s or 1 Mbit/s) can be factory programmed on request. Contact Axiomatic for an ordering p/n. • All parameter locations have default values that do not conflict. • Module is fully functional during configuration and communications. • Parameter values and diagnostic error codes are retained when the modules are de-energized. • Easily selectable SPNs from a drop down list of the temperature SPNs supported by SAE J1939. • User defined SPN and PGN's configurable with Electronic Assistant® to suit the application. • Configurable ECU Instance in the NAME to allow for multiple ECU's on the same network
SAE J1939 Profile	For J1939 compliance (SAE, Recommended Practice for a Serial Control and Communications Vehicle Network, October 2007) all modules comply with the applicable portions of the following: SAE J1939-21, December 2006, Data Link Layer SAE J1939-71, January 2009, Vehicle Application Layer SAE J1939-73, September 2006, Application Layer – Diagnostics SAE J1939-81, May 2003, Network Management *Customer specific proprietary extensions can also be included in the SAE J1939 profile on request.*
Diagnostics	Configurable Diagnostic Messaging parameters Diagnostic Log is maintained in non-volatile memory. Each thermocouple channel could be configured to send diagnostic messages to the network if the temperature goes out of range. When sending an "Active Diagnostic Trouble Code" (DM1) or a "Previously Active Diagnostic Trouble Codes" (DM2) message, the controller will use the appropriate Diagnostic Trouble Code (DTC). As defined by the standard, this is a combination of the Suspect Parameter Number (SPN), the Failure Mode Indicator (FMI), Occurrence Count (OC) and the SPN Conversion Method (CM).
User Interface	Electronic Assistant®, P/N: AX070502 Updates for the EA are found on www.axiomatic.com under the log-in tab.
Compliance	UL508 (April 2010) (FTPM2) – Controls for Stationary Engine Driven Assemblies pending cUL C22.2 No. 14-10 (2010) pending EMC pending RoHS compliant Environmental testing completed (Contact Axiomatic for details.)
Operating Temperature Range	-40 to 85 °C (-40 to 185 °F)
Storage Temperature Range	-50 to 120 °C (-58 to 248 °F)
Humidity	Protected against 95% humidity non-condensing, 30 °C to 60 °C
Protection	IP65, Pollution Degree 3 per UL508
Weight	2.2 lbs. (1.00 kg)

Packaging	Rugged aluminum housing, stainless steel end plates, neoprene gaskets 145.30 x 149.00 x 73.00 mm (5.72 x 5.86 x 2.87") L x W x H Connectors, Deutsch IPD P/N: 1 8-pin DT13-08PA, 1 40-pin DRC13-40PA Can be mounted directly on the power generator set or remotely Suitable for moist, high shock, vibrating and non-hazardous environments

Dimensional Drawing



Electrical Pin Out – Power and CAN	 **FRONT VIEW** **MODULE MOUNTED CONNECTOR** **DEUTSCH P/N: DT13-08PA** **1 = PWR+ 5 = SHIELD** **2 = CAN-H 6 = RS-232 GND** **3 = CAN-L 7 = RS-232 TXD** **4 = PWR- 8 = RS-232 RXD** (Mating plug is DT06-08SA with wedgelock W8S and sockets 0462-201-16141.)

Electrical Pin Out - Thermocouples	*Type J, K, B, E, N, R, S or T*  + -  **FRONT VIEW OF MODULE MOUNTED CONNECTOR DEUTSCH P/N: DRC13-40PA** **(The mating connector is Deutsch IPD P/N DRC16-40SA with 40 sockets 0462-201-16141.)**

Specifications are indicative and subject to change. Actual performance will vary depending on the application and operating conditions. Users should satisfy themselves that the product is suitable for use in the intended application. All our products carry a limited warranty against defects in material and workmanship. Please refer to our Warranty, Application Approvals/Limitations and Return Materials Process as described on www.axiomatic.com/service.html.

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